Planning Period 2013 - 2033

Regional Wastewater Facilities Plan

City of Versailles, KY

GRW Project No. 4132

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engineering | architecture | geospatial

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WASTEWATER FACILITIES PLAN UPDATE
CITY OF VERSAILLES, KENTUCKY

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WASTEWATER FACILITIES PLAN UPDATE
CITY OF VERSAILLES, KENTUCKY

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Section 1

SECTION 1
REGIONAL FACILITIES PLAN SUMMARY

A. Purpose of the Facilities Plan

The purpose of this Regional Wastewater Facilities Plan is to develop a cost effective and environmentally sound strategy for improving the wastewater collection and treatment systems in the City of Versailles's Planning Area, to accommodate existing needs and projected growth during the Planning Period of 2013 to 2033.

The City of Versailles was notified by the Division of Water of an update to regulation 401 KAR 5:006 "Wastewater Planning Requirement for Regional Planning Agencies" which requires either an update to their existing Facilities Plan (because it is over ten years old), or the submission of an Asset Inventory Plan. Because the City is currently planning an expansion (of greater than 30% of their existing averaged daily design capacity) to their Wastewater Treatment Plant, which also requires the Facilities Plan be updated, the City elected to proceed with the full Facilities Plan update. GRW Engineers was selected and contracted by Versailles to prepare the update to their Facilities Plan.

The major areas (or goals) to be considered in this Facilities Plan include:

- Review and evaluation of the City's wastewater collection system and wastewater treatment plant to assess their current physical condition, capacity and improvement needs;

- Review of current compliance with U.S. EPA Clean Water Act regulations, KPDES permit discharge limitations as well as with future anticipated limits and other associated requirements;

- Evaluate impacts of wastewater loads on the City's wastewater collection and treatment facilities from areas outside of the current wastewater Planning Area;

- Study alternatives to expand and improve the capacity and effectiveness of the wastewater treatment facilities to meet current and future requirements;

- Develop a Capital Improvements Plan to meet the future needs of the wastewater collection and treatment system so that such improvements can be funded and implemented in accordance with a schedule that matches the future requirements of the system;

- Ensure that public participation is included in the development of the recommended plan for wastewater collection and treatment system improvements;

- Address anticipated adverse environmental impacts of the proposed improvements, as identified by state and federal agencies that have reviewed this Plan.

B. Background

The existing Versailles Wastewater Treatment Plant (WWTP) in Versailles, Kentucky is located at 338 Kentucky Avenue on the western side of the City. The plant discharges at mile point 12.4 of Glenns Creek which is a wet weather tributary to the Kentucky River. The plant currently has an average treatment capacity of 3.0 million gallons per day (MGD) with a peak hydraulic capacity of 9.0 MGD. The plant was constructed in 1992 and the most recent plant upgrade was completed in 2005.

The Versailles wastewater collection system is considered "separate" as opposed to a "combined" system, which means that there are separate pipes dedicated to transporting storm and sanitary flows. The sewer system has expanded to accommodate the City's population growth. Due to the topography of Versailles, the system is primarily gravity flow, with neighborhood pump stations collecting flow and pumping into trunk sewers which carry the wastewater to the treatment plant.

Two previous wastewater Facilities Plans have been prepared for the City of Versailles. The original plan was completed in 1978 and an update was provided in 2001. Both plans were prepared for a regional wastewater Planning Area that encompassed the City of Versailles and most of central Woodford County.

The City of Versailles entered into an Agreed Order with the Kentucky Energy and Environment Cabinet Division of Enforcement in August 2009 (See Appendix A) due to permit limit violations for total suspended solids (TSS), total ammonia nitrogen (NH3-N), dissolved oxygen (DO) and sanitary sewer overflows (SSOs). Remedial measures listed in the Agreed Order included: immediate reporting of spills, SSOs, and bypasses; maintaining monitoring, calibration and maintenances records; the development and implementation of a Sanitary Sewer Overflow Plan (SSOP); and the development and implementation of a Sewer System Evaluation Survey (SSES).

Since the execution of the Agreed Order, the City of Versailles has been maintaining proper records and notifying the Energy and Environment Cabinet of spills, bypasses or other discharges as outlined. An SSOP has also been developed and submitted to the KDEP Division of Enforcement in December 2009. This SSOP has been implemented and the City continues to follow the outlined protocol. The City has also completed the Sewer System Evaluation Survey (SSES). The rehabilitation work included in the SSES is currently being completed and submitted to the Division of Water.

The treatment plant is expected to receive increased flows during the Planning Period due to increased residential and commercial/industrial growth within the Planning Area. By 2033, the treatment plant is expected to receive an average daily flow of 4.5 MGD and a peak flow of 12.5 MGD.

C. Recommended Alternatives Chosen

This Regional Wastewater Facilities Plan includes a series of projects in the wastewater collection system and at the treatment plant in order to provide increased capacity for current and future wastewater flows from customers within the Planning Area. As stated hereinbefore, the wastewater collection system rehabilitation work included in this Plan resulted from the City's SSES recommendations. The rehabilitation work within the SSES is divided into five (5) phases with the intent for one phase to be completed each year. The SSES rehabilitation work includes approximately 308,000 LF of closed-circuit TV (CCTV), 132,000 LF of line rehabilitation, 605 manhole repairs and 4 lift station rehabilitations. The SSES rehabilitation work is included within the 0-10 year planning period. At the time of this report, approximately $5,710,000 has been financed by the City to pay for the first three phases of the SSES rehabilitation work and part of the fourth phase.

The Recommended Plan also calls for construction of projects at the wastewater treatment plant which will provide increased treatment capacity. After considering the four (4) alternatives for upgrading and expanding the plant (including a No Action Alternative), three viable treatment and disinfection alternatives were evaluated from a monetary (present worth) and non-monetary standpoint. The non-monetary analysis included five (5) factors: Environmental Impact, Engineering Evaluation, Implementability, Regionalization and Public Support. The improvements to the wastewater treatment plant are included within the 0-10 year planning period.

In regards to the four (4) disinfection alternatives compared, **Disinfection Alternative 1 - Ultraviolet Light** is recommended due to its low present worth cost and its proven history of reliability. Other advantages of using UV disinfection include: elimination of 1-ton cylinders of chlorine and associated health hazards in the area of the wastewater treatment plant.

Regarding the four (4) treatment alternatives evaluated, **Treatment Alternative 2 - Sequencing Batch Reactor (SBR)** was selected as the preferred treatment alternative due to its lower present worth cost, its non-monetary analysis and its proven history of reliability. The recommended Treatment Alternative 2 - SBR includes the following components:

- New influent Parshall Flume

- Two (2) new stacked tray vortex grit removal units, each rated at 6.25 MGD with grit classifying, washing and dewatering.

- New Preliminary Treatment Building:
  - Approximately 1,800 square feet.
  - One (1) new ¼" mechanically cleaned fine screen with washing press and compactor, each rated at 12.5 MGD.
  - One (1) manual bar rack and one bypass channel

- New 12.5 MGD Influent Pump Station including submersible pumps, wet well and valve vault.

- One (1) new concrete SBR unit divided into four (4) basins using common wall construction, one (1) new blower building and one (1) influent valve box for flow distribution to the SBR basins. The SBR system includes mixers, WAS pumps, decanters, blowers, diffusers, valves and control system.

- Demolition of existing clarifiers and their mechanical equipment. Conventional clarifiers are no longer needed with SBR technology.

- Peak 12.5 MGD capacity Ultraviolet Disinfection System including a new structure, gates, fixed weir, jib crane, Parshall flume and ultrasonic flow measurement. The ultraviolet disinfection system would replace chlorine gas as the disinfection method.

- Modifications & improvements to the existing Belt Filter Press and Polymer Feed system including two (2) new sludge feed pumps (WAS).

- Rehabilitation of the three (3) blowers for the existing aerated sludge holding tanks. New aeration diffusers and piping are included as well as improvements to the drain sump.

- Existing lagoons to be dewatered and backfilled with soil. Existing sludge to be hauled away.

- Site piping, road work, and miscellaneous equipment.

- New Emergency Generator & Electrical Control Building

- Lab/administration building modifications including new lab equipment.

- New non-potable water pumping station.

- Solids disposal via transportation and landfill.

The City has elected to take another advantage of the recommended SBR alternative. The existing oxidation ditches that will be abandoned will be converted to equalization basins for wet weather flow storage. The oxidation ditches can store approximately 3.0 million gallons. Flows in excess of the peak hydraulic capacity of 12.5 MGD would be diverted to the converted EQ basins and then returned for treatment at a controlled rate as the wet weather flow subsides.

The Sludge Handling facilities were revamped during the 2005 construction project which was designed to handle the future flows. The improvement to the sludge handling facilities included one (1) 1.3 million gallon aerated sludge holding basin, which was divided into two (2) basins; a new sludge blower building; two (2) 200 gpm progressive cavity sludge pumps; a new sludge polymer feed system; and a new belt filter press.

Due to the age of the sludge management facilities, some upgrades to the existing equipment are necessary to facilitate efficient operations. The proposed upgrades and their associated costs are included with each Treatment Alternative. The proposed upgrades include the following components:

- Replace sludge feed pumps

- Upgrade polymer feed system

- Replace aeration diffusers and air piping

- Rehabilitate aeration blowers

- Drain sump improvements for better cleaning

In addition to the SSES rehabilitation work, additional collection system improvements are recommended within the 11-20 year planning period. The Sycamore Estates subdivision, located in the eastern portion of the Planning Area, is currently served by septic systems. It is proposed that the City would receive wastewater flow from Sycamore Estates subdivision and the surrounding area upon the completion of a sewer system expansion project. The cost for construction of this project would be borne by Woodford County and the residents within the impacted area. The proposed sewer system expansion would include the construction of 8-inch gravity sewers, 4-inch and 8-inch force mains and four (4) additional pump stations.

D. Summary of Estimated Cost

The Estimated Project Costs for the Recommended Plan are outlined in Table 1-1. The Estimated Project Costs include estimated construction, engineering, administrative and legal costs, expressed in 2013 dollars.

Table 1-1
Estimated Project Costs
Recommended Plan

Project	Estimated Cost
0-10 Year Planning Period	
SSES Collection System Rehabilitation - Phases 4 & 5	*$2,115,000*
Treatment Plant Improvement - SBR & UV	*$19,827,840*
Treatment Plant Wet Weather Storage	*$1,083,300*
0-10 Year Estimated Cost	***$23,026,140***
11-20 Year Planning Period	
Sycamore Estates Collection System Expansion	*$6,439,669*
11-20 Year Estimated Cost	***$6,439,669***
Total Estimated Project Costs	***$29,465,809***

E. Environmental Impacts

Correspondence was exchanged with various state and federal agencies that relate to potential adverse impacts of the Recommended Plan. The responses from these agencies indicate that the Recommended Plan does not have a negative impact on surface and groundwater, threatened or endangered species, air quality, floodplains and wetlands, historical or archaeological sites, important prime farmland, or any other applicable environmentally sensitive areas. See Appendix K for documentation.

F. Institutional Structure

There are no changes required to the existing institutional structure of the City of Versailles as a result of the Recommended Plan. Other than a revised user charge system for paying debt service and the annual operating and maintenance costs for the Recommended Plan, no new ordinances or regulations are needed to implement the Recommended Plan.

G. Funding Plan

A preliminary funding plan has been prepared for the Recommended Plan. This includes an assessment of potential funding sources and preliminary estimates for potential user rates. The funding plans are based on the estimated projects costs and annual operating and maintenance costs of the projects in this plan. These costs are evaluated against a combination of funding options to provide estimated annual debt service and annual O&M costs that must be paid by the wastewater system customers as monthly sewer service rates. It should be noted that the calculations presented in the funding plan are preliminary and will require revision once the actual construction costs are known (from contractor's bids for the projects in this Plan) and the amounts and availability of grants and loans have been confirmed. Therefore, this information is presented to provide a preliminary order of magnitude for sewer service rates, and the City will need to conduct a separate User Charge Study to determine the actual rates needed to pay for the Recommended Plan.

As outlined in Table 1-1, the estimated cost for the projects in the 0-10 year planning period is $23,026,140. Funding options have only been considered for the 0-10 year planning period as a result of discussion with City personnel. Three (3) Funding Options were considered in this Recommended Plan. Funding Option 1 evaluates a 20-year payback period, and Options 2 & 3 evaluates 30- and 40-year payback periods, respectively.

The shorter payback period will require larger annual debt service costs than the longer periods, but will result in total interest costs being lower. For the 20 year loan, user rates will have to increase by approximately 55.62%. For the 30 year loan, the increase would be 47.52%, and for the 40 year loan, an increase of 43.12% is required. Detailed discussion of these options is included in Section 10.

H. Schedule and Method of Implementation

The schedule for implementation of the Recommended Plan is a function of factors, such as the timing of approval of this Regional Facilities Plan by the KDOW, the dates when funds are secured for the projects within this plan, and the respective dates for completion of design and construction of the projects.

At the time that this Regional Facilities Plan was prepared, these dates were not known. However, for the purpose of this Plan, the preliminary schedule, located below, has been developed. This schedule is subject to revision over time as the estimated dates of the aforementioned factors are updated. Table 1-2, located on the following page, outlines the preliminary implementation schedule for the Recommended Plan.

Table 1-2 Preliminary Implementation Schedule for Versailles Regional Wastewater Facilities Plan	
Estimated Date	**Event**
August 2014	Submit Draft Plan to KDOW for review and comment
September 16, 2014	Public Meeting for Plan, Approval of Plan by City of Versailles
October 2014	Submit Final Plan to KDOW for review and comment
December 2014	Approval of Plan by KDOW
December 2014	Initiate Design of Wastewater Treatment Plant
December 2015	Complete Design of Wastewater Treatment Plant
December 2015	Submit Design of Wastewater Treatment Plant to KDOW
July 2015 - September 2017	Phase 4 of Collection Rehabilitation Program
February 2016	Approval of WWTP Design by KDOW
March 2016	Advertisement for Bids for Wastewater Treatment Plant
April 2016	Receipt of Bids, Securing of Funds for Wastewater Treatment Plant
May 2016	Award of Construction Contract for Wastewater Treatment Plant
July 2016 - September 2018	Phase 5 of Collection Rehabilitation Program
March 2018	Complete Construction of Wastewater Treatment Plant Improvements